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(71) Applicant:  
Hewlett-Packard Company  
Palo Alto, California 94304 (US)(72) Inventors:  
• Chen, Yong  
Mountain View, California 94041 (US)

- Yang, Long  
Union City, California 94587 (US)
- Wang, Shih-Yuan  
Palo Alto, California 94306 (US)
- Schneider, Richard P.  
Mountain View, California 94040 (US)

(74) Representative:  
Liesegang, Roland, Dr.-Ing.  
FORRESTER & BOEHMERT  
Franz-Joseph-Strasse 38  
80801 München (DE)

## (54) Low voltage-drop electrical contact for gallium (aluminium, indium) nitride

(57) An electrical contact (130, 230, 330, 430) that comprises a layer (118) of a p-type gallium nitride material, a metal layer (134), and a intermediate layer (132, 232, 332, 432) of a material different from the gallium nitride material and the metal layer. The intermediate layer is sandwiched between the layer of p-type gallium nitride material and the metal layer. The material of the intermediate layer (132) may be a Group III-V semiconductor that has high band-gap energy, lower than that of the p-type gallium nitride material. The intermediate layer (232) may alternatively include layers (e.g., 240, 242, 244) of different Group III-V semiconductors. The layers of the different Group III-V semiconductors are arranged in order of their band-gap energies, with the Group III-V semiconductor having the highest band-gap energy next to the layer of the p-type gallium nitride material, and the Group III-V semiconductor having the lowest band-gap energy next to the metal layer. As a further alternative, the material of the intermediate layer (332) may be a metal nitride. As a yet further alternative, the material of the intermediate layer (432) may be a gallium nitride material in which a percentage of the nitrogen atoms are replaced by a mole fraction  $x$  of atoms of at least one other Group V element. The value of  $x$  is close to zero next to the layer (118) of a type gal-

zero next to the metal layer (134).

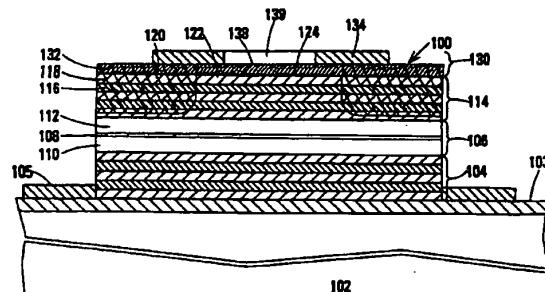


FIG.1



| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |                   | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |  |
|--|---|-------------------|--|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages   | Relevant to claim | H01L29/45<br>H01L33/00                       |  |
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| The present search report has been drawn up for all claims                       |   |                   |  |  |
| Place of search  | Date of completion of the search  | Examiner          |  |  |
| BERLIN   | 13 November 1998  | Juh1, A           |  |  |
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